

REMARKS

The Office Action dated November 3, 2003, has been received and carefully noted. The following remarks are submitted as a full and complete response thereto.

Claim 1-18 are currently pending and respectfully submitted for consideration.

The Applicants wish to thank the Examiner for the interview granted on February 19, 2004. In the interview, claims 1-18 and the Uchikawa et al. (European Patent Application No. 0319031, "Uchikawa") and Matsumura et al. (European Patent Application No. 0463543A1, "Matsumura") references were discussed. The Applicants also discussed a draft Declaration under 37 C.F.R. § 1.132, in which experimental results set forth the unexpected results achieved by the claimed invention over the cited references. As a result of the interview, the Examiner indicated that further consideration would be given to the claims in view of the signed Declaration.

Claims 1-4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Uchikawa et al. (European Patent Application No. 319 031, "Uchikawa") in view of Matsumura et al. (European Patent Application No. 463 543 A1, "Matsumura"). Claims 5-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Uchikawa in view of Matsumura and Sato et al. (U.S. Patent No. 5,989,021, "Sato").

Applicants discovered a new quartz glass crucible as a result of paying attention to the bubbles of the quartz glass crucible after pulling up a silicon single crystal from the crucible. As a consequence, the claimed invention recites the effective ranges of conditions for the prevention of bubble expansion of a quartz glass crucible after pulling up the silicon single crystal. Thus, the claimed invention is new in the art. The Applicants submit that the prior art fails to disclose or suggest the claimed invention,

and therefore, fails to provide the critical and non-obvious advantages that are provided by the invention.

To this end, the Applicants submit a Declaration under 37 C.F.R. §1.132. In this Declaration, the Applicants have provided comparative experimental data which show the criticality of the claimed limitations in order to produce the claimed product, and that the claimed values for the gas content, OH group concentration, heat melting power horizontal distance, distance from arc center ("the variables") are critical and impart unexpected properties in the crucible base body. As such, the advantages achieved in the present invention are not obvious and would not occur if the variables in the claims were changed from what is recited in each claim. In the Declaration, the Applicants present three comparative examples of a quartz glass crucible for pulling up a silicon single crystal.

In each of the three examples, the gas content is different from that recited in claims 1-3, resulting in a different product. This difference caused the silicon single crystal to go into a disorder in the course of pulling up. Further, the transparent layer of the inner surface of the quartz glass crucible after use was observed and many bubbles of a disadvantageous size were found in a layer from the inner surface outside of the claimed range. As a result, some bubbles burst after reaching the inner surface from inside during pulling up. Therefore, the Applicants submit that the claimed product (the crucible) is different from the prior art in that unexpected differences in the product result from the claimed variables. Also, the advantages achieved in the present invention are not obvious, and would not occur if the variables, such as the gas content were changed from those recited in the claims.

The Applicants further submit that the experimental results lend patentable weight to the claimed process limitations because the process limitations are shown to impart unexpected properties in the product. As Uchikawa, Matsumura do not disclose or suggest the features of the invention as recited in claims 1-3 and 14-16, and do not produce the unexpected results claimed thereby, the Applicants respectfully submit that there are non-obvious differences between the prior art and the crucible produced by the claimed process. Accordingly, claims 1-3 and 14-16 are not obvious in view of the combination of Uchikawa and Matsumura.


Although the claims recite silicon dioxide powder and the experimental data uses synthetic quartz powder, the Applicants submit that while silicon dioxide powder is used in the present invention, either of synthetic quartz glass powder and natural quartz glass powder can be used. See pages 10-11 of the specification.

Claims 4-13 depend from claims 1-3, and claims 17 and 18 depend from claims 14-16. The Applicants respectfully submit that these dependent claims are allowable at least because of their dependency from allowable base claims 1-3 and 14-16. Accordingly, the Applicants respectfully request allowance of claims 1-18 and the prompt issuance of a Notice of Allowability.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing Attorney Dkt. No. 107242-09013.**

Respectfully submitted,



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Enclosures: Declaration under 37 C.F.R. §1.132
Petition for Extension of Time (1-month)